

REMARKS

Corrections to the Description of Drawings has been made and, on Page 7 a reference to a Fig. has been included. No new matter has been added.

Claims 1, 3 and 4 have been amended. Claims 1-20 remain in the application.

5 The purpose of our invention is to provide GROUND FAULT CIRCUIT INTERRUPTERS (GFCIs), the GFCI itself, not an auxiliary external down stream positioned device for use with a GFCI, with increased Transient Voltage and Overvoltage Surge protection. The existing family of GFCI products include an internally located MOV which provides protection for the components within the GFCI by clamping transient voltages to acceptable
10 levels. The clamping is determined by the size of the disc of the MOV and the voltage rating of the MOV. Present day GFCIs normally have transient voltages of about 6KV at 100 Amps. With our invention, the same MOV can now sustain a transient surge voltage of 6KV at 3000 amps. Clearly, a significant improvement.

 In addition to providing transient surge enhancement, with our invention it was
15 determined that an MOV rated at 120V is able to survive a 240V overload condition, thus allowing the MOV to exceed the RMS voltage rating.

 In our invention, to obtain suppression of the transient voltage, within a GFCI, an LC low pass filter circuit is connected across the MOV. The MOV clamps the voltage across the capacitor to be within the rating of the capacitor. As noted above, protection against surges is
20 obtained up to 6KV. Protection for transients which exceed this voltage can be obtained by including a spark gap. The spark gap is designed to break over at transients that exceed 6KV. As our invention is located within a GFCI and is used to protect the components within the GFCI, the solenoid bobbin which is the actuator used to disengage the relay mechanism can be the inductor of the LC low pass filter. The capacitor of the LC low pass filter can be a film
25 capacitor, normally a by-pass capacitor.

 In operation, with our invention, when an over voltage surge condition occurs, the LC elements limit the current that the MOV is exposed to during the overload surge condition.

Normally, when an MOV is used at a voltage that is beyond it's rating, it will disintegrate and fail. But, by limiting the current in the MOV as we do, the exposure to RMS voltages beyond it's rating will not damage the MOV or the other components of the GFCI.

None of the references cited disclose or even suggest doing what we disclose and claim
5 as our invention, that of an LC low pass filter in shunt with the MOV of the GFCI for filtering transient power surges to the MOV.

The rejection of Claims 1-6, 17 and 18 under 35 U.S.C. 102(b) as being anticipated by LM 1851 Data Sheet from National Semiconductor Corp. is traversed. The LM 1851 reference is a description of the characteristics and specifications of the LM 1851 chip manufactured by
10 National Semiconductor Corp and illustrates the use of the chip in a typical Ground Fault Interrupter circuit. See Fig. 2 identified as a Typical Application. In our application, Figs. 2, 3 and 4, we identify chip 42 as being the LM1851 chip. Nowhere does the LM 1851 reference disclose or suggest an LC low pass filter circuit connected across the MOV of the GFCI circuit for filtering transient power surges to the MOV as we disclose and claim. Claim 17 avoids the
15 LM 1851 reference by reciting the step of filtering transient power surges from power inputs to the MDV component using a low pass filter.

The rejection of Claims 1-5, 17 and 18 under 35 U.S.C. 102(b) as being anticipated by Muelleman (US Patent 5,448,443) is traversed. The Examiner asserts that Muelleman discloses all of the elements of Claim 1 and 17, including a device for protecting a ground fault circuit
20 interrupter including a surge protector component (element MOV in Fig. 17), and filter (elements T1 and C in Fig 17) connected across the power inputs of the GFCI circuit for filtering transient power surges to the surge protector component.

Muelleman is directed towards blocking surges currents that are injected into a power distribution system by voltage clamping devices such as MOVs.(Col. 5, Lines 18-27).
25 Muelleman notes (Col. 7, L 37-52) that the hot and the neutral lines are immune from the problems of surges currents caused by clamping devices because they include an impedance that blocks the formation of copper-continuous current loops where such impedance is typically a transformer. Muelleman also notes that the transformer does not block surge currents on the

ground lines. See Col. 7, Line 61 to Col. 8, Line 4. Thus, Muelleman is directed toward blocking surge currents in the ground lines only, and one device that he uses to do this is the circuit 32 of Fig. 17 which includes an MOV connected across a winding of a transformer. See Col.10, Lines 7-11, where Muelleman states that his device "... is a stand alone device with a
5 line plug 46 that plugs into a wall receptacle, and with receptacles where the electrical equipment is plugged in." In this instance, the electrical equipment that is plugged in is a GFCI. Thus, as disclosed Muelleman, to protect a GFCI from fault currents, the device of Muelleman is plugged into a wall socket and a standard GFCI is then plugged into the device of Muelleman. Clearly, the device of Muelleman is not an integral part of the internal circuit of a GFCI and does not in
10 any way modify or change the connections to or operation of the MOV located inside the GFCI. The Muelleman device is an external device used upstream of a standard GFCI.

Nowhere does Muelleman disclose or even suggest how the MOV within a GFCI, can be modified as we disclose and claim to protect the MOV from surge currents .

Claims 2-8 depend from claim 1 and, therefore, also avoids the LM 1851 and Muelleman
15 references.

The Examiner, in referring to Claim 4 asserts that LM 1851 discloses an LC filter having a filter capacitor and inductor (circuit breaker coil and capacitor 0.01/400V in Fig. 2). It is our understanding that the capacitor is used to block DC from flowing through the winding of the neutral coil and, at the same time, allow 120 Hz energy to be fed continuously to the neutral coil
20 to allow some of the energy to couple into the sense transformer during conditions of neutral fault. Clearly, the capacitor of LM 1851 does not cooperate with the winding of the circuit breaker to function as an LC filter.

Regarding Claim 6, the circuit breaker coil of Fig. 2 of LM 1851 is not used as an inductor of a filter because LM 1851 discloses no LC low pass filter.

25 The rejection of claims 7, 8, 19, and 20 under 35 U.S.C. 103(a) as being unpatentable over Muelleman in view of Newman (US Patent 5,555,150) is traversed. As discussed in detail above, the Muelleman reference clearly does not disclose the elements of our Claim 1. In addition, the Examiner states that Newman discloses an MOV (element 28 in Fig. 1) used

together with the low pass LC filter (elements 18 and 16a, 16b in Fig. 1). Newman is directed toward protecting electronic ballasts and other equipment with EMI and RFI suppression networks connected between the power line and electronic components. See Col. 3, Line 34-39. He does this by allowing the RFI filter components to “ring” up to high voltages, and then he
5 provides a spark gap to have electrical breakdown occur at a prescribed point. It is our understanding that a ringing circuit is not considered to be a low pass filter. Down stream of the “ringing “ circuit, surge suppression is provided after the RFI filter by a single ungrounded MOV. The filter that Newman refers to is a Radio Frequency Filter, not a low pass filter. Newman is concerned with surge suppression by providing a device that permits the filter to ring
10 up to high voltages, and then provides a mechanism whereby electrical breakdown occurs at a prescribed voltage. Newman does not disclose doing what we disclose and claim as our invention.

The rejection of claims 7 and 8 under 35 U.S.C. 103(a) as being unpatentable over LM 1851 in view of Newman is traversed for the reasons noted above.

15 Our Claims 19 and 20 avoid the art of record and are considered to be in allowable form. Claims 19 and 20 depend from Claim 17 which recited the step of filtering transient power surges to the surge protector component using a low pass filter.

The rejection of claims 9-16 under 35 U.S.C. 103(a) as being unpatentable over LM 1851 in view of :Paradise (US Patent 5,617,284) is traversed. As clearly noted above the LM 1851
20 reference discloses the chip that is present in the GFCI circuit. It discloses nothing more. The Paradise reference is directed to a device that is positioned upstream of the electronic circuit that is to be protected and down stream of a source of power. See Col. 4, Lines 9-15 wherein Paradise states that “The power surge protection apparatus 10 is interfaced between an alternating current (AC) electrical power source, for example ... a wall outlet, and circuitry to be
25 protected, for example but not limited to, communication equipment...(etc.)”. Neither LM 1851 nor Paradise, either separately or combined, disclose or even suggest doing what we disclose and claim as our invention, that of placing an LC low pass filter across the MOV located within a GFCI device for filtering transient power surges applied to the MOV within the device. Our

invention is not directed to providing a device which is located in front of the device to be protected as the Paradise patent does.

It is here noted that it is only after the Examiner has read and fully understood our invention that he has attempted to combine the various references to anticipate doing what we
5 have done and claim as our invention.

The prior art made of record but not relied upon has been read and found to be of interest.

Applicants respectfully submit that the application is in condition for allowance and respectfully request early and favorable action by the Examiner. If the Examiner believes that additional issues may be resolved by a telephone interview, the Examiner is respectfully urged to
10 telephone the undersigned attorney.

The commissioner is hereby authorized to charge any additional fees which may be required for the amendment to Deposit Account No. 12-1185 of Leviton Manufacturing Co., Inc.

In the event that an extension of time is required to make this Amendment timely filed, the Commissioner is requested to grant a petition for that extension of time which is required to
15 make this response timely and is hereby authorized to charge any fee for such an extension of time to Deposit Account No. 12-1185 of Leviton Manufacturing Co., Inc.

Respectfully submitted,

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